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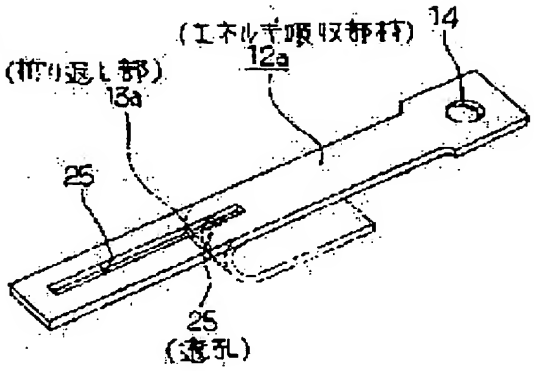
(54) ENERGY ABSORBING MEMBER FOR SHOCK-ABSORBING TYPE STEERING WHEEL

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an energy absorbing member which can optionally change the shock absorbing function without changing the dimensions and shapes of a fold-back part thereof, including a thickness, a widths and a curvature so that a holding member for holding the fold-back part can be commonly used for various kinds of energy absorbing members.
SOLUTION: That part which is adapted to be plastically deformed upon secondary collision, and in which a fold-back part 13a is formed is formed therein at its widthwise central part with a through-hole 25 having dimensions and a shape which are limited so as to adjust the shock-absorbing function of the shock-absorbing member 12a, whereby it is possible to enable various kinds of energy absorbing members to fit a common holding part.



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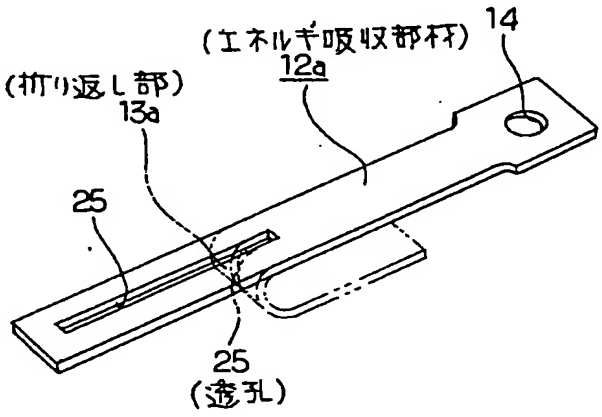
(54)【発明の名称】衝撃吸収式ステアリング装置用エネルギ吸収部材

(57)【要約】
【課題】　折り返し部１３ａの厚さ、幅、曲率等の形状を変えずに、エネルギ吸収部材１２ａの衝撃吸収性能を変更自在とする。これにより、この折り返し部１３ａをがたつきなく保持する為の扱き部材の共通化を可能にする。
【解決手段】　二次衝突時に塑性変形する部分である、上記折り返し部１３ａを形成した部分の幅方向中央部に透孔２５を形成する。この透孔２５の形状、幅、長さを規制して、上記エネルギ吸収部材１２ａの衝撃吸収性能を調整し、上記課題を解決する。



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【特許請求の範囲】

【請求項１】　塑性変形自在な帯状の金属板により造られ、基端部と先端部との間に存在する長さ方向中間部をＵ字形に折り返す事により折り返し部とし、ステアリングコラムと車体に固定の部分とのうちの一方に上記基端部を結合すると共に、これらステアリングコラムと車体に固定の部分とのうちの他方に支持された扱き部材を上記折り返し部の内周側に配置し、衝突事故の際の衝撃により上記ステアリングコラムが前方に変位する際に、上記扱き部材により上記折り返し部を扱いてこの折り返し部を先端側に移動させる状態で使用される衝撃吸収式ステアリング装置用エネルギ吸収部材に於いて、衝突事故の際に上記扱き部材により扱かれて上記折り返し部が移動する部分の幅方向中間部に透孔を形成する事により当該部分の断面積を変えて、上記折り返し部を移動させる事により得られる衝撃エネルギの吸収性能を調節した事を特徴とする衝撃吸収式ステアリング装置用エネルギ吸収部材。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明に係る衝撃吸収式ステアリング装置用エネルギ吸収部材は、衝突事故の際に衝撃エネルギを吸収しつつ塑性変形し、ステアリングホイールにぶつかった運転者の身体に加わる衝撃を緩和する。

【０００２】

【従来の技術】衝突事故の際には、自動車が他の自動車等と衝突する一次衝突に続いて、運転者の身体がステアリングホイールに衝突する二次衝突が発生する。この二次衝突の際に運転者の身体に加わる衝撃を緩和し、この運転者の身体に重大な損傷を与える事を防止するのを目的として、衝撃吸収式ステアリング装置と呼ばれる運転者保護装置が、従来から種々考えられている。又、二次衝突の際の衝撃エネルギを吸収する為の部材も、従来から種々知られている。このうち、軟鋼板等の塑性変形自在な金属板の一部をＵ字形に折り返して成るエネルギ吸収部材は、構造が比較的簡単で、小型且つ安価な衝撃吸収式ステアリング装置を得られる事から、従来から一般的に使用されている。

【０００３】図５～８は、この様なエネルギ吸収部材を組み込んだ従来の衝撃吸収式ステアリング装置の１例として、実公平６－４５４１５号公報に記載されたものを示している。後端部（図５～７の右端部）にステアリングホイール１を固定したステアリングシャフト２は、ステアリングコラム３の内側に回転自在に支持している。又、この様なステアリングコラム３は、中間部に溶接固定した支持ブラケット４を介して、車体５に支持している。十分な剛性を有する鋼板等をプレス成形する事により造られた、上記支持ブラケット４は、上記ステアリングコラム３の左右両側に突出する１対の取付板部６、６を有する。

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【０００４】これら各取付板部６、６の後端部には１対の切り欠き７、７を、これら各取付板部６、６の後端縁側に開口する状態で形成している。又、これら各取付板部６、６の後端部で上記各切り欠き７、７に対応する部分に、それぞれ摺動ブラケット８を外嵌している。これら摺動ブラケット８は、金属板を折り曲げ形成する事により、或は合成樹脂を射出成形する事により、全体をコ字形に形成している。上記各取付板部６、６の後端部は、この様な摺動ブラケット８を構成する１対の滑り板部９、９により挟持している。そして、これら各滑り板部９、９の互いに整合する部分に形成した挿通孔１０、１０と上記切り欠き７、７とに、ボルト１１を挿通すると共に、このボルト１１の雄ねじ部を前記車体５に形成したねじ孔に螺合し、更に緊締する事により、上記支持ブラケット４をこの車体５に支持している。

【０００５】そして、上記支持ブラケット４と車体５との間に、二次衝突時の衝撃エネルギを吸収する為の、エネルギ吸収部材１２を装着している。このエネルギ吸収部材１２は、軟鋼板等の塑性変形自在な帯状の金属板を折り曲げ形成する事により、全体をＪ字形に形成している。即ち、この様なエネルギ吸収部材１２を構成すべく、図６に実線で示す様な帯状の金属板の中間部を、同じく鎖線で示す様にＵ字形に１８０度折り返す事により、先端部（図５～７の左端部）に折り返し部１３を形成している。又、上記帯状の金属板の基端部（図５～７の右端部）に、挿通孔１４を形成している。

【０００６】この様なエネルギ吸収部材１２は、上述の様に車体５に螺合・緊締したボルト１１と、上記各取付板部６、６の前端部（図５～７の左端部）に外嵌固定した扱き部材１５とに掛け渡した状態で装着している。即ち、上記エネルギ吸収部材１２の基端部は、この基端部を上記車体５の下面と上記摺動ブラケット８の上面との間で挟持すると共に、上記挿通孔１４に上記ボルト１１を挿通する事により、上記車体５に結合固定している。一方、上記折り返し部１３を形成した、上記エネルギ吸収部材１２の先端部は、上記扱き部材１５の外周面に係止している。

【０００７】図８に詳示する様に、上記扱き部材１５は、合成樹脂を射出成形する事により、全体を略Ｊ字形に形成しており、互いに平行な１対の平板部１６ａ、１６ｂと、これら各平板部１６ａ、１６ｂの前端縁同士を連続させる断面半円弧状の連続部１７とを有する。又、この連続部１７及び一方の平板部１６ａの幅方向両端縁に、それぞれが外周側に広がる、互いに平行な１対のフランジ部１８、１８を設けている。これら各フランジ部１８、１８の互いに対向する内側面同士の間隔は、上記エネルギ吸収部材１２の幅寸法よりも僅かに大きくしている。

【０００８】又、上記各フランジ部１８、１８の内側面

のうち、上記連続部１７の外径側部分には、それぞれガイド突片１９、１９を設けている。これら各ガイド突片１９、１９の先端縁（上記連続部１７側の端縁）とこの連続部１７の外周面との間には、上記エネルギ吸収部材１２の板厚よりも僅かに大きな隙間が存在する。又、上記一方の平板部１６ａの外面［図８（ｂ）の下面］と対向する部分に、その両端部を上記両フランジ部１８、１８の内側面に連結した、ガイド板２０を設けている。このガイド板２０と上記一方の平板部１６ａとの間には、上記エネルギ吸収部材１２を構成する帯状の金属板の一端側部分を大きながたつきなく挿通自在な隙間が存在する。更に、他方の平板部１６ｂの先端部内側面に、係合部２１を突設している。

【０００９】上述の様な扱き部材１５は、前記各取付板部６、６の前端部をＵ字形に折り返して成る被嵌合部２２、２２に、外嵌支持している。即ち、上記１対の平板部１６ａ、１６ｂ同士の間にこれら各被嵌合部２２、２２を、上記連続部１７と反対側から差し込んでいる。そして、これら被嵌合部２２、２２の外周面を上記連続部１７の内周面に当接させた状態で、上記他方の平板部１６ｂの先端部内側面に形成した係合部２１を、上記被嵌合部２２、２２の端縁に形成した切り欠き状の被係合部２３、２３に係合させている。又、この状態で、上記ガイド板２０の外面［図８（ｂ）の下面］は、上記各取付板部６、６の前端寄り部に形成した抑え板部２４、２４により支持される。

【００１０】そして、上述の様な扱き部材１５に上記エネルギ吸収部材１２の先端部を係止すべく、このエネルギ吸収部材１２の先端部を上記連続部１７及び上記１対の平板部１６ａ、１６ｂの外周面に沿って外嵌している。即ち、このエネルギ吸収部材１２を構成する帯状の金属板の先端部分を、上記一方の平板部１６ａと上記ガイド板２０との間部分に挿通すると共に、前記折り返し部１３を上記連結部１７の外周面と上記各ガイド突片１９、１９の先端縁との間に配置している。又、この状態で上記エネルギ吸収部材１２の先端部は、上記扱き部材１５に設けた１対のフランジ部１８、１８同士の間で、幅方向に互るがたつきなく保持している。

【００１１】上述の様に構成するエネルギ吸収部材１２を組み込んだ衝撃吸収式ステアリングコラム装置は、衝突事故の際に次の様に作用して、ステアリングホイール１にぶつかった運転者の身体に加わる衝撃を緩和する。衝突事故に伴う二次衝突により、ステアリングコラム３を介して支持ブラケット４に前方（図５～７の左方）に向く強い衝撃が加わると、上記取付板部６、６の後端部と前記各滑り板部９、９との間に作用する摩擦力に抗して、これら各取付板部６、６の後端部がこれら各滑り板部９、９の間部分から前方に抜け出る。これにより、上記支持ブラケット４が上記ステアリングコラム３と共に前方に変位する。

【００１２】そして、上述の様に支持ブラケット４が前方に変位する結果、上記エネルギ吸収部材１２の折り返し部１３は、上記扱き部材１５の連続部１７の外周面により扱かれつつ、図７に鎖線で示す様に前方に変位する。言い換えれば、上記折り返し部１３の形成位置が、上記エネルギ吸収部材１２を構成する帯状の金属板の先端側に移動する。この際、このエネルギ吸収部材１２の一部は、その長さ方向に亙って連続的に塑性変形する。この結果、上記ステアリングコラム３に加わった衝撃エネルギが吸収され、上記ステアリングホイール１にぶつかった運転者の身体に加わる衝撃が緩和される。

【００１３】尚、前述した様に、上記折り返し部１３を形成した上記エネルギ吸収部材１２の先端部は、上記扱き部材１５に設けた１対のフランジ部１８、１８同士の間で、幅方向に互るがたつきなく保持されている。この為、上述の様にエネルギ吸収部材１２の一部が長さ方向に亙って連続的に塑性変形する際にも、このエネルギ吸収部材１２の先端部が幅方向に変位する事を防止できる。この為、上述の様な衝撃エネルギの吸収を安定して行なえる。

【００１４】又、板状のエネルギ吸収部材を組み込んだ衝撃吸収式ステアリング装置の別例として、特開平７－３２９７９６号公報には、エネルギ吸収部材をステアリングコラムの上面側に配置する構造が記載されている。この公報に記載された構造の場合、二次衝突の衝撃によりステアリングコラムが前方に変位した際には、車体側に固定したエネルギ吸収部材の屈曲部を、上記ステアリングコラム側に固定した扱きピンで扱く事により、この屈曲部の形成位置を上記エネルギ吸収部材の先端側に移動させる。そして、この際に上記エネルギ吸収部材の一部が長さ方向に亙り連続的に塑性変形する事に基づき、二次衝突時の衝撃エネルギを吸収する。

【００１５】

【発明が解決しようとする課題】上述の様なエネルギ吸収部材を組み込んだ衝撃吸収式ステアリング装置に要求される衝撃吸収性能は、この衝撃吸収式ステアリング装置を搭載する車種により異なる。この為、この衝撃吸収式ステアリング装置を搭載する車種に応じて上記衝撃吸収性能を調節する必要がある。この様な衝撃吸収性能の調節を行なう為に従来は、例えば、上記エネルギ吸収部材１２のうち、前記折り返し部１３が形成される部分の幅寸法や厚さ寸法を変えたり、或は上記折り返し部１３の曲率を変える等して、この折り返し部１３の形成位置を前記金属板の長さ方向に亙り移動させつつ吸収する衝撃荷重を調節していた。ところが、この様に折り返し部１３が形成される部分の幅寸法や厚さ寸法、或は曲率を変える等する場合には、これに合わせて、この折り返し部１３が形成される部分をがたつきなく保持する為の部材である、扱き部材１５の寸法や形状も変える必要が生じる。この為、異なる車種同士の間で扱き部材を共通化

する事に基づくコストの低減を図れない。

【００１６】一方、上述の特開平７－３２９７９６号公報に記載された衝撃吸収式ステアリング装置の場合には、エネルギ吸収部材の配置個所が、スペース的にゆとりのない、ステアリングコラムの上面側である為、車種によっては実施が難しい場合もある。又、このステアリングコラム側に固定する扱きピンの組み付け作業が面倒である。本発明の衝撃吸収式ステアリング装置用エネルギ吸収部材は、上述の様な事情に鑑みて発明したものである。

【００１７】

【課題を解決するための手段】本発明の衝撃吸収式ステアリング装置用エネルギ吸収部材は、塑性変形自在な帯状の金属板により造られ、基端部と先端部との間に存在する長さ方向中間部をＵ字形に折り返す事により折り返し部とし、ステアリングコラムと固定の部分とのうちの一方に上記基端部を結合すると共に、これらステアリングコラムと固定の部分とのうちの他方に支持された扱き部材を上記折り返し部の内周側に配置し、衝突事故の際の衝撃により上記ステアリングコラムが前方に変位する際に、上記扱き部材により上記折り返し部を扱いてこの折り返し部を先端側に移動させる状態で使用される。特に、本発明の衝撃吸収式ステアリング装置用エネルギ吸収部材に於いては、衝突事故の際に上記扱き部材により扱かれて上記折り返し部が移動する部分の幅方向中間部に透孔を形成する事により当該部分の断面積を変えて、上記折り返し部を移動させる事により得られる衝撃エネルギの吸収性能を調節している。

【００１８】

【作用】上述の様に本発明の衝撃吸収式ステアリング装置用エネルギ吸収部材の場合には、折り返し部が移動する部分の幅方向中間部に透孔を形成する事により、当該部分の断面積を変えて、衝撃エネルギの吸収性能を調節している。この為、衝撃吸収式ステアリング装置を搭載する車種に応じて、エネルギ吸収部材による衝撃吸収性能を変える場合でも、上記透孔の形状及び寸法が変化する以外、このエネルギ吸収部材の形状及び寸法が変化する事はない。この為、要求される衝撃吸収性能が異なる車種同士の間で扱き部材等の共通化を図れる。

【００１９】

【発明の実施の形態】図１は、本発明の実施の形態の第１例を示している。尚、本発明の特徴は、エネルギ吸収部材１２ａの形状にある。特に、本例の場合、このエネルギ吸収部材１２ａを組み込む衝撃吸収式ステアリング装置の構造及び作用に関しては、前述の図５～８に示した従来構造の場合と同様である。この為、本例のエネルギ吸収部材１２ａを組み込む衝撃吸収式ステアリング装置に就いての図示及び説明は省略若しくは簡略にし、以下、本例のエネルギ吸収部材１２ａの構造及び作用を中心に説明する。

【００２０】本例のエネルギ吸収部材１２ａは、前述した従来のエネルギ吸収部材１２（図５～７）の場合と同様、軟鋼板等の塑性変形自在な帯状の金属板を折り曲げ形成する事により、全体をＪ字形に形成している。即ち、この様なエネルギ吸収部材１２ａを構成すべく、図１に実線で示す様な帯状の金属板の中間部を、同じく鎖線で示す様にＵ字形に１８０度折り返す事により、先端部（図１の左端部）に折り返し部１３ａを形成している。又、上記帯状の金属板の基端部（図１の右端部）に、ボルト１１（図７）を挿通する為の挿通孔１４を形成している。

【００２１】特に、本例のエネルギ吸収部材１２ａの場合には、上記帯状の金属板のうち、二次衝突に基づく衝撃エネルギの吸収時に上記折り返し部１３ａが移動する部分の幅方向中央部に、この帯状の金属板の長さ方向に亙り長い透孔２５を形成している。即ち、二次衝突に基づく衝撃エネルギを吸収する際に、上記エネルギ吸収部材１２ａの先端部に設けた折り返し部１３ａは、扱き部材１５の連続部１７（図５～８）の外周面により扱かれて、前述の図７に鎖線で示す様に前方に変位する。言い換えれば、上記折り返し部１３ａの形成位置が、上記エネルギ吸収部材１２ａを構成する帯状の金属板の先端側（図１の左端側）に向け移動する。上記透孔２５は、この様に折り返し部１３ａが移動する部分である、上記帯状の金属板の長さ方向の中央部分から先端寄り部分に亙る範囲で形成している。又、本例の場合、この透孔２５の幅寸法は、全長に亙り等しくしている。

【００２２】ところで、上述の様な二次衝突時の衝撃エネルギは、上述の様に折り返し部１３ａが帯状の金属板の先端側に向け移動する際、この帯状の金属板の一部が長さ方向に亙って連続的に塑性変形する事に基づいて吸収される。又、この様に金属板の一部が塑性変形する事により吸収できる衝撃エネルギの大きさは、この様に塑性変形する金属板の一部の断面積（厚さ寸法×幅寸法）の大きさに比例する。この為、本例の場合には、上述の様な透孔２５を形成する事により、上記帯状の金属板のうち、上記折り返し部１３ａが形成される部分の断面積（厚さ寸法×充実部分の幅寸法）を規制して、上記エネルギ吸収部材１２ａの衝撃吸収性能を調節している。

【００２３】上述の様に本例のエネルギ吸収部材１２ａの場合には、このエネルギ吸収部材１２ａによる衝撃吸収性能を調節する為に、このエネルギ吸収部材１２ａを構成する帯状の金属板の一部で、衝撃エネルギの吸収時に折り返し部１３ａが移動する部分の幅方向中央部に、この帯状の金属板の長さ方向に亙り長い透孔２５を形成している。この為、上記エネルギ吸収部材１２ａを組み込んだ衝撃吸収式ステアリング装置を搭載する車種に応じて、このエネルギ吸収部材１２ａによる衝撃吸収性能を変える場合でも、上記透孔２５の形状及び寸法が変化する以外、このエネルギ吸収部材１２ａの形状及び寸法

が変化する事はない。この為、要求される衝撃吸収性能が異なる車種同士の間で、上記エネルギ吸収部材１２ａをがたつきなく保持する為の扱き部材１５（図５～８）の共通化を図れる。

【００２４】次に、図２は、本発明の実施の形態の第２例を示している。本例の場合、エネルギ吸収部材１２ｂに形成する透孔２５ａの幅寸法を、この透孔２５ａの長さ方向に亙り変化させている。即ち、本例の場合には、この透孔２５ａの幅寸法を、上記エネルギ吸収部材１２ｂを構成する帯状の金属板の先端部（図２の左端部）に向かう程漸次狭くなる様にしている。この様に構成する本例の場合、上記帯状の金属板のうち上記透孔２５ａを形成した範囲では、この帯状の金属板の断面積（厚さ寸法×充実部分の幅寸法）が先端側に向かう程大きくなる。この為、二次衝突時に折り返し部１３ｂを先端側に移動させつつ吸収する衝撃エネルギを、ステアリングコラム３（図５～７）の前方への変位量が大きくなるに従って大きくでき、運転者保護の面から、より効果的な衝撃吸収を行なえる。即ち、本例の場合には、上記透孔２５ａの基端側（図２の右端側）の幅寸法を大きくして、二次衝突の直後に運転者の身体に加わる衝撃荷重を十分に小さくできる。この為、運転者の保護をより効果的に図れる。その他の構成及び作用は、上述した第１例の場合と同様である。

【００２５】次に、図３は、上述した第１～２例のエネルギ吸収部材１２ａ（１２ｂ）を組み込む衝撃吸収式ステアリング装置の別例を示している。この図３に示した衝撃吸収式ステアリング装置の場合、上記エネルギ吸収部材１２ａ（１２ｂ）の基端部をステアリングコラム３の下面に固定すると共に、車体に固定の部分に支持した扱き部材１５ａを、折り返し部１３ａ（１３ｂ）の内周側に配置している。従って、この扱き部材１５ａは、上記エネルギ吸収部材１２ａ（１２ｂ）の基端部よりも後方に設けている。即ち、エネルギ吸収部材１２ａ（１２ｂ）の配置が、前述の場合とは前後逆である。このエネルギ吸収部材１２ａ（１２ｂ）自体の構成及び作用は、上述した第１～２例の場合と同様である。

【００２６】尚、図４は、上述した本発明の構造と前述した従来構造との、それぞれの衝撃吸収性能を示している。この図４中、実線αは、金属板の幅方向中間部に透孔を形成していない、前記図５～７に示した従来のエネルギ吸収部材の衝撃吸収性能を、鎖線βは、図１に示した本発明の実施の形態の第１例のエネルギ吸収部材１２ａの衝撃吸収性能を、破線γは、図２に示した本発明の実施の形態の第２例のエネルギ吸収部材１２ｂの衝撃吸収性能を、それぞれ示している。尚、上記鎖線β及び破線γ上に現れた変化点イ、ロ、ハの位置は、前述した透孔２５、２５ａの幅、長さ、形状等を変える事により、自由に調節可能である。即ち、本発明のエネルギ吸収部材の場合には、このエネルギ吸収部材の幅方向中間部に形成する透孔の形状（上述の図１～２に示した形状以外の形状とする事もできる）、幅、長さ等を適宜選択する事により、各種自動車に要求される衝撃吸収性能を容易に実現できる。

【００２７】

【発明の効果】本発明の衝撃吸収式ステアリング用エネルギ吸収部材は、以上に述べた通り構成し作用する為、要求される衝撃吸収性能が異なる車種同士の間で、本発明のエネルギ吸収部材をがたつきなく保持する為の部材の共通化を図れる。この結果、製造コストを低減できる。

【図面の簡単な説明】

【図１】本発明の実施の形態の第１例を示す、エネルギ吸収部材の斜視図。

【図２】同第２例を示す斜視図。

【図３】本発明の実施の形態の第１～２例のエネルギ吸収部材を組み込んだ衝撃吸収式ステアリング装置の別例を示す部分側面図。

【図４】エネルギ吸収部材の衝撃吸収性能を、本発明と従来構造とで比較して示す線図。

【図５】従来のエネルギ吸収部材を組み込んだ衝撃吸収式ステアリング装置の概略側面図。

【図６】図５のＸ部に対応する分解斜視図。

【図７】二次衝突の前後の状態で示す、図５のＸ部に対応する概略側面図。

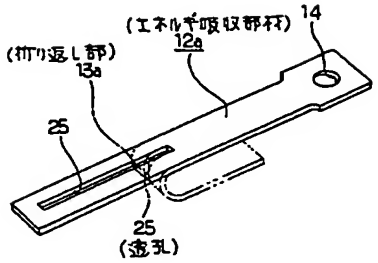
【図８】扱き部材を示しており、（ａ）は（ｂ）の左から見た図、（ｂ）は（ａ）のＹ－Ｙ断面図、（ｃ）は（ａ）のＺ－Ｚ断面図。

【符号の説明】

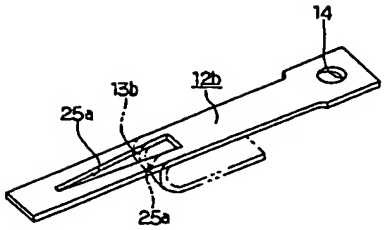
１　ステアリングホイール
２　ステアリングシャフト
３　ステアリングコラム
４　支持ブラケット
５　車体
６　取付板部
７　切り欠き
８　摺動ブラケット
９　滑り板部
１０　挿通孔
１１　ボルト
１２、１２ａ、１２ｂ　エネルギ吸収部材
１３、１３ａ、１３ｂ　折り返し部
１４　挿通孔
１５、１５ａ　扱き部材
１６ａ、１６ｂ　平板部
１７　連続部
１８　フランジ部
１９　ガイド突片
２０　ガイド板
２１　係合部

２２　被嵌合部
２３　被係合部
２４　抑え板部
２５、２５ａ　透孔

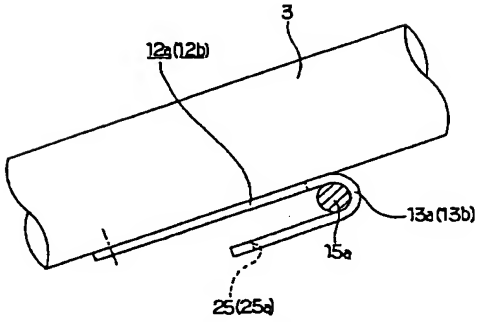
【図１】



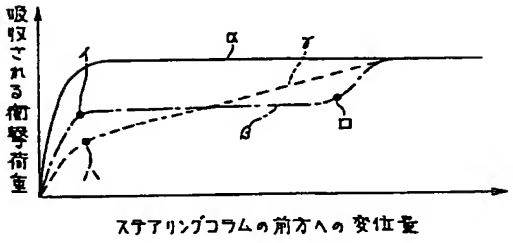
【図２】



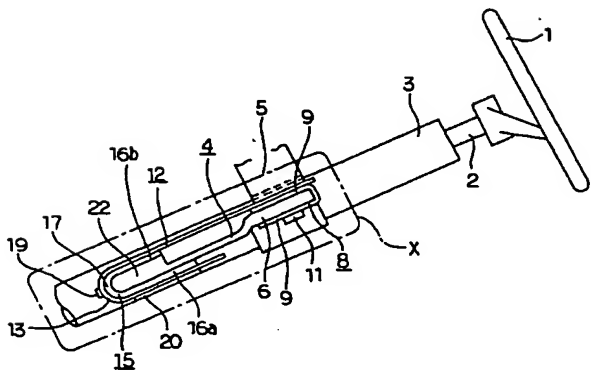
【図３】



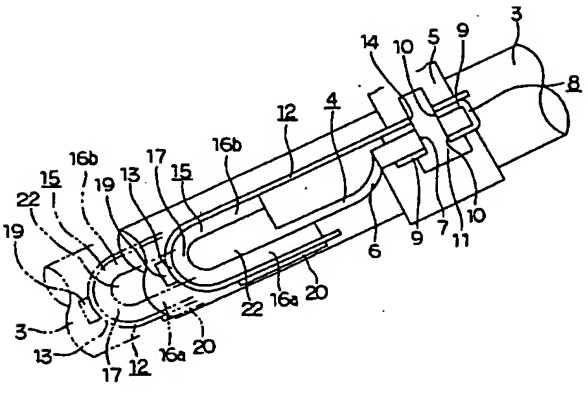
【図４】



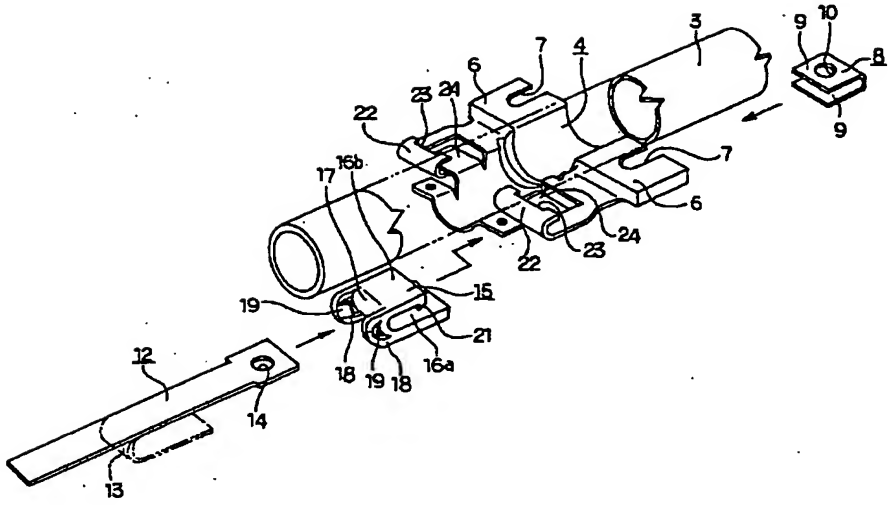
【図５】



【図７】



【図６】


3
9
10
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23
24
22
16b
17
15
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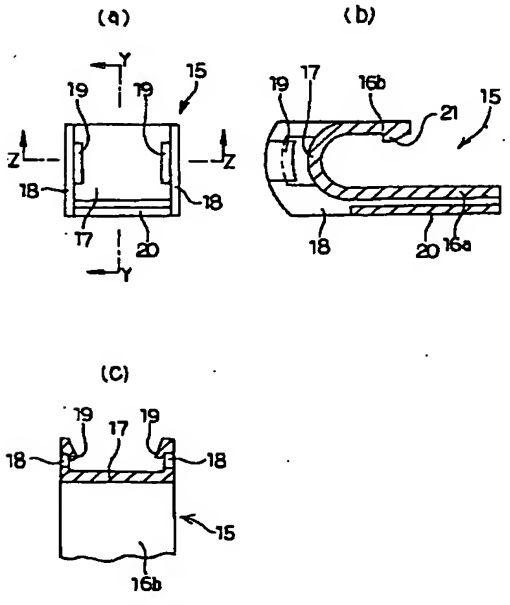
16a
14
13

【図８】


(a)
(b)
(c)
Y
Z
15
19
17
16b
21
18
20
16a

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It is built by the band-like metal plate which can be freely deformed plastically, and considers as the section by return by turning up the die-length direction pars intermedia which exists between the end face section and a point to U typeface. While combining the above-mentioned end face section with one of a steering column and the parts of immobilization into a car body It was supported by another side of these steering columns and the parts of immobilization into a car body, draw through, and a member is arranged to the inner circumference side of the above-mentioned clinch section. In case the above-mentioned steering column displaces ahead by the impact in case of a collision In the energy absorption member for impact-absorbing type steering systems used in the condition of drawing through the account of a top, treating the above-mentioned clinch section by the member, and moving the clinch section of a lever to a tip side The cross section of the part concerned is changed by forming a bore in the crosswise pars intermedia of a part where it draws through the account of a top, it is drawn through by the member, and the above-mentioned clinch section moves in case of a collision. The energy absorption member for impact-absorbing type steering systems characterized by adjusting the absorptivity ability of the striking energy acquired by moving the above-mentioned clinch section.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] It is deformed plastically, the energy absorption member for impact-absorbing type steering systems concerning this invention absorbing striking energy in case of a collision, and eases the impact which joins the body of the operator who collided with the steering wheel.
[0002]
[Description of the Prior Art] In case of a collision, the secondary collision with which an operator's body collides with a steering wheel occurs following the primary collision with which an automobile collides with other automobiles etc. The impact which joins an operator's body in the case of this secondary collision is eased, and the operator protective device called an impact-absorbing type steering system for the purpose of preventing doing serious damage for this operator's body is variously considered from the former. Moreover, the member for absorbing the striking energy in the case of a secondary collision is also variously known from the former. Among these, the energy absorption member which turns up some metal plates of a mild steel plate etc. which can be deformed plastically to U typeface, and changes is comparatively easy structure, and since it can obtain a small and cheap impact-absorbing type steering system, generally it is used from the former.
[0003] Drawing 5 -8 show what was indicated by JP,6-45415,Y as one example of the conventional impact-absorbing type steering system incorporating such an energy absorption member. The steering shaft 2 which fixed the steering wheel 1 to the back end section (right end section of drawing 5 -7) is supported free [rotation] inside a steering column 3. Moreover, such a steering column 3 is supported into the car body 5 in pars intermedia through the bearing bracket 4 which carried out welding immobilization. The above-mentioned bearing bracket 4 built by carrying out press forming of the steel plate which has sufficient rigidity has one pair of tie-down plate sections 6 and 6 which project on right-and-left both sides of the above-mentioned steering column 3.
[0004] One pair of notching 7 and 7 is formed in the back end veranda of each [these] tie-down plate sections 6 and 6 in the condition of carrying out opening at the back end section of each [these] tie-down plate sections 6 and 6. Moreover, the sliding bracket 8 is attached outside the part corresponding to each above-mentioned notching 7 and 7, respectively in the back end section of each [these] tie-down plate sections 6 and 6. these sliding bracket 8 bends and forms a metal plate -- or the whole is formed in a KO typeface by carrying out injection molding of the synthetic resin. The back end section of each above-mentioned tie-down plate sections 6 and 6 is pinched by one pair of sliding-plate sections 9 and 9 which constitute such a sliding bracket 8. And while inserting a bolt 11 in the insertion holes 10 and 10 and the above-mentioned notching 7 and 7 of each [these] sliding-plate sections 9 and 9 which were formed in the part to adjust [each other], it ****s, and screws in a hole and the above-mentioned bearing bracket 4 is supported into this car body 5 by [which formed the male screw section of this bolt 11 in said car body 5] binding further.
[0005] And it has equipped with the energy absorption member 12 for absorbing the striking energy at the time of a secondary collision between the above-mentioned bearing bracket 4 and a car body 5. This energy absorption member 12 forms the whole in J typeface by bending and forming the band-like metal plate of a mild steel plate etc. which can be deformed plastically. That is, the section 13 is formed in a point (left end section of drawing 5 -7) by return by turning up 180 degrees to U typeface, as the chain line similarly shows the pars intermedia of a band-like metal plate as shown in drawing 6 as a continuous line that such an energy absorption member 12 should be constituted. Moreover, the insertion hole 14 is formed in the end face section (right end section of drawing 5 -7) of the above-mentioned band-like metal plate.
[0006] As mentioned above, the car body 5 is equipped with such an energy absorption member 12 at the bolt 11 screwed and bound and the front end section (left end section of drawing 5 -7) of each above-mentioned tie-

down plate sections 6 and 6, where [which carried out outside attachment immobilization] it drew through and a member 15 is built. That is, the end face section of the above-mentioned energy absorption member 12 is carrying out joint immobilization at the above-mentioned car body 5 by inserting the above-mentioned bolt 11 in the above-mentioned insertion hole 14 while pinching this end face section between the inferior surface of tongue of the above-mentioned car body 5, and the top face of the above-mentioned sliding bracket 8. On the other hand, the point of the above-mentioned energy absorption member 12 in which the above-mentioned clinch section 13 was formed was drawn through the account of a top, and has stopped to the peripheral face of a member 15.

[0007] It draws through the account of a top, the member 15 forms the whole in an abbreviation J typeface by carrying out injection molding of the synthetic resin, and it has mutually one pair of parallel monotonous sections 16a and 16b, and the continuation section 17 of a cross-section semicircle arc which the front end edges of each [these] monotonous sections 16a and 16b are made to follow so that it may **** to drawing 8 . Moreover, each has formed one pair of flanges 18 and 18 parallel to each other which spread in a periphery side in this continuation section 17 and the crosswise both-ends edge of one monotonous section 16a. Spacing of the medial surfaces which each [these] flanges 18 and 18 counter mutually is slightly enlarged rather than the width method of the above-mentioned energy absorption member 12.

[0008] Moreover, the guide protruding pieces 19 and 19 are formed in a part for the outer-diameter flank of the above-mentioned continuation section 17 among the medial surfaces of each above-mentioned flanges 18 and 18, respectively. Between the tip edge (edge by the side of the above-mentioned continuation section 17) of each [these] guide protruding pieces 19 and 19, and the peripheral face of this continuation section 17, a slightly bigger clearance than the board thickness of the above-mentioned energy absorption member 12 exists. Moreover, the guide plate 20 which connected the both ends with the external surface {the inferior surface of tongue of drawing 8 (b)} of above-mentioned one monotonous section 16a and the part which counters at the medial surface of both the above-mentioned flanges 18 and 18 is formed. Between this guide plate 20 and monotonous section 16a of the method of top Norikazu, the clearance which can insert in freely a part for the end flank of the band-like metal plate which constitutes the above-mentioned energy absorption member 12 without big shakiness exists. Furthermore, the engagement section 21 is protruded on the point medial surface of monotonous section 16b of another side.

[0009] Outside attachment support is carried out at the above fitting-ed [which it draws through, and a member 15 turns up the front end section of each of said tie-down plate sections 6 and 6 to U typeface, and changes] sections 22 and 22. That is, each [these] insertion **** 22 and 22 is inserted from the above-mentioned continuation section 17 and the opposite side between the one above-mentioned pair of monotonous section 16a and 16b. And the engagement section 21 formed in the point medial surface of monotonous section 16b of above-mentioned another side is made to engage with the engaged portions 23 and 23 of the shape of notching formed in the edge of the above-mentioned fitting-ed sections 22 and 22 in the condition of having made the peripheral face of the fitting-ed [these] sections 22 and 22 contacting the inner skin of the above-mentioned continuation section 17. Moreover, the external surface {the inferior surface of tongue of drawing 8 (b)} of the above-mentioned guide plate 20 is supported in this condition by prevention {tabe 24 and 24 who formed in the front end approach section of each above-mentioned tie-down plate sections 6 and 6.

[0010] and above -- the point of this energy absorption member 12 is attached outside along with the peripheral face of the above-mentioned continuation section 17 and the one above-mentioned pair of monotonous sections 16a and 16b that it should draw through and the point of the above-mentioned energy absorption member 12 should be stopped to a member 15. That is, while inserting in a part for Mabe of above-mentioned one monotonous section 16a and the above-mentioned guide plate 20 a part for the point of the band-like metal plate which constitutes this energy absorption member 12, said clinch section 13 is arranged between the peripheral face of the above-mentioned connection section 17, and the tip edge of each above-mentioned guide protruding pieces 19 and 19. Moreover, in this condition, between one pair of flanges 18 which drew through the account of a top and were prepared in the member 15, and 18 comrades, the point of the above-mentioned energy absorption member 12 continues crosswise, shakes, and is held that there is nothing.

[0011] The impact-absorbing type steering column equipment incorporating the energy absorption member 12 constituted as mentioned above acts as follows in case of a collision, and eases the impact which joins the body of the operator who collided with the steering wheel 1. By the collision thing, therefore the secondary collision by which it is accompanied, if the strong impact which is ahead (left of drawing 5 -7) suitable through a steering column 3 at a bearing bracket 4 is added, the frictional force which acts between the back end section of the above-mentioned tie-down plate sections 6 and 6 and said each sliding-plate sections 9 and 9 is resisted, and

the back end section of each [these] tie-down plate sections 6 and 6 will fall out ahead from a part for Mabe, each [these] sliding-plate sections 9 and 9, and will come out. Thereby, the above-mentioned bearing bracket 4 displaces ahead with the above-mentioned steering column 3.

[0012] And being drawn [as a result of a bearing bracket's 4 displacing ahead as mentioned above, draw the clinch section 13 of the above-mentioned energy absorption member 12 through the account of a top, and] through by the peripheral face of the continuation section 17 of a member 15, as the chain line shows to 7 , it displaces ahead. In other words, the formation location of the above-mentioned clinch section 13 moves to the tip side of the band-like metal plate which constitutes the above-mentioned energy absorption member 12. Under the present circumstances, a part of this energy absorption member 12 is continuously deformed plastically covering that die-length direction. Consequently, the striking energy which joined the above-mentioned steering column 3 is absorbed, and the impact which joins the body of the operator who collided with the above-mentioned steering wheel 1 is eased.

[0013] In addition, between one pair of flanges 18 which drew through the account of a top and were prepared in the member 15, and 18 comrades, the point of the above-mentioned energy absorption member 12 which formed the above-mentioned clinch section 13 like mentioned above continues crosswise, shakes, and is held that there is nothing. Also in case a part of energy absorption member 12 deforms plastically continuously covering the die-length direction as mentioned above for this reason, it can prevent that the point of this energy absorption member 12 displaces crosswise. For this reason, it is stabilized and absorption of the above striking energy can be performed.

[0014] Moreover, the structure which arranges an energy absorption member to the top-face side of a steering column is indicated by JP,7-329796,A as example of another of the impact-absorbing type steering system incorporating a tabular energy absorption member. When a steering column displaces ahead by the impact of a secondary collision in the case of the structure indicated by this official report, the formation location of this flection is moved to the tip side of the above-mentioned energy absorption member by [which fixed to the above-mentioned steering column side the flection of the energy absorption member fixed to the car-body side] drawing through and drawing through by the pin. And based on a part of above-mentioned energy absorption member deforming plastically continuously for this in the die-length direction, the striking energy at the time of a secondary collision is absorbed.

[0015]

[Problem(s) to be Solved by the Invention] The impact absorptivity ability required of the impact-absorbing type steering system incorporating the above energy absorption members changes with types of a car which carry this impact-absorbing type steering system. For this reason, it is necessary to adjust the above-mentioned impact absorptivity ability according to the type of a car which carries this impact-absorbing type steering system. The impact load absorbed changing the width method and thickness dimension of a part in which said clinch section 13 is formed among the above-mentioned energy absorption members 12, or carrying out changing the curvature of the above-mentioned clinch section 13 etc., and moving the formation location of this clinch section 13 conventionally covering the die-length direction of said metal plate in order to adjust such impact absorptivity ability was adjusted. however, when carrying out [change / the width method of a part the section 13 is formed in this appearance by return, a thickness dimension, or curvature], it is a member for shaking and holding the part in which this clinch section 13 is formed according to this, that there is nothing — it will be necessary to draw through and to also change the dimension and configuration of a member 15 For this reason, reduction of cost based on drawing through among different types of a car, and communalizing a member cannot be aimed at.

[0016] In the case of the impact-absorbing type steering system indicated by above-mentioned JP,7-329796,A on the other hand, since the arrangement part of an energy absorption member is the top-face side of a steering column which is hard-pressed in tooth space, depending on a type of a car, operation may be difficult. Moreover, it fixes to this steering column side, and draws through, and the attachment activity of a pin is troublesome. The energy absorption member for impact-absorbing type steering systems of this invention is invented in view of the above situations.

[0017]

[Means for Solving the Problem] The energy absorption member for impact-absorbing type steering systems of this invention While being built by the band-like metal plate which can be freely deformed plastically, considering as the section by return by turning up the die-length direction pars intermedia which exists between the end face section and a point to U typeface and combining the above-mentioned end face section with one of a steering column and the parts of immobilization It was supported by another side of these steering columns and

the parts of immobilization, draw through, and a member is arranged to the inner circumference side of the above-mentioned clinch section. In case the above-mentioned steering column displaces ahead by the impact in case of a collision, it is used in the condition of drawing through the account of a top, treating the above-mentioned clinch section by the member, and moving the clinch section of a lever to a tip side. By forming a bore in the crosswise pars intermedia of a part where it draws through the account of a top, it is drawn through by the member, and the above-mentioned clinch section moves especially in the energy absorption member for impact-absorbing type steering systems of this invention in case of a collision, the cross section of the part concerned is changed and the absorptivity ability of the striking energy acquired by moving the above-mentioned clinch section is adjusted.

[0018]

[Function] As mentioned above, by forming a bore in the crosswise pars intermedia of a part where the clinch section moves, in the case of the energy absorption member for impact-absorbing type steering systems of this invention, the cross section of the part concerned is changed, and the absorptivity ability of striking energy is adjusted to it. Even when changing the impact absorptivity ability by the energy absorption member according to the type of a car which carries an impact-absorbing type steering system for this reason, except that the configuration and dimension of the above-mentioned bore change, the configuration and dimension of this energy absorption member do not change. For this reason, it draws through among the types of a car from which the impact absorptivity ability demanded differs, and communalization of a member etc. can be attained.

[0019]

[Embodiment of the Invention] Drawing 1 shows the 1st example of the gestalt of operation of this invention. In addition, the description of this invention is in the configuration of energy absorption member 12a. It is the same as that of the case of structure conventionally which was especially shown in the above-mentioned drawing 5 -8 about the structure of an impact-absorbing type steering system and the operation incorporating this energy absorption member 12a in this example. the illustration and explanation which take the post of the impact-absorbing type steering system incorporating energy absorption member 12a of this example for this reason -- an abbreviation -- or it is made simple and explains hereafter focusing on the structure of energy absorption member 12a of this example, and an operation.

[0020] Energy absorption member 12a of this example forms the whole in J typeface by bending and forming the band-like metal plate of a mild steel plate etc. which can be deformed plastically like the case of the conventional energy absorption member 12 (drawing 5 -7) mentioned above. That is, section 13a is formed in a point (left end section of drawing 1) by return by turning up 180 degrees to U typeface, as the chain line similarly shows the pars intermedia of a band-like metal plate as shown in drawing 1 R> 1 as a continuous line that such energy absorption member 12a should be constituted. Moreover, the insertion hole 14 for inserting a bolt 11 (drawing 7) in the end face section (right end section of drawing 1) of the above-mentioned band-like metal plate is formed.

[0021] Especially, the long bore 25 is formed in the crosswise center section of the part in which the above-mentioned clinch section 13a moves among the above-mentioned band-like metal plates at the time of absorption of the striking energy based on a secondary collision in energy absorption member 12a of this example covering the die-length direction of this band-like metal plate. That is, in case the striking energy based on a secondary collision is absorbed, clinch section 13a prepared in the point of the above-mentioned energy absorption member 12a draws through, is drawn through by the peripheral face of the continuation section 17 (drawing 5 -8) of a member 15, and as the chain line shows to above-mentioned drawing 7 , it is displaced ahead. In other words, the formation location of the above-mentioned clinch section 13a moves towards the tip side (left end side of drawing 1) of the band-like metal plate which constitutes the above-mentioned energy absorption member 12a. The above-mentioned bore 25 is formed in the range ranging from the central part to a tip approach part of the die-length direction of the above-mentioned band-like metal plate which is the part which section 13a moves to this appearance by return. Moreover, in this example, the width method of this bore 25 covers an overall length, and is made equal.

[0022] By the way, the striking energy at the time of the above secondary collisions is absorbed based on a part of this band-like metal plate deforming plastically continuously covering the die-length direction, in case clinch section 13a moves towards the tip side of a band-like metal plate as mentioned above. Moreover, the magnitude of striking energy absorbable when some metal plates deform plastically to this appearance is proportional to the magnitude of a part of cross sections (thickness dimension x width method) of the metal plate deformed plastically to this appearance. For this reason, by forming the above bores 25, in this example, the cross section (width method of a thickness dimension x fullness part) of the part in which the above-mentioned clinch section

13a is formed among the above-mentioned band-like metal plates is regulated, and the impact absorptivity ability of the above-mentioned energy absorption member 12a is adjusted to it.
[0023] The long bore 25 is formed in the crosswise center section of the part in which section 13a moves by return as mentioned above at the time of absorption of striking energy with some band-like metal plates which constitute this energy absorption member 12a in energy absorption member 12a of this example in order to adjust the impact absorptivity ability by this energy absorption member 12a covering the die-length direction of this band-like metal plate. Even when changing the impact absorptivity ability by this energy absorption member 12a according to the type of a car which carries the impact-absorbing type steering system incorporating the above-mentioned energy absorption member 12a for this reason, except that the configuration and dimension of the above-mentioned bore 25 change, the configuration and dimension of this energy absorption member 12a do not change. For this reason, among the types of a car from which the impact absorptivity ability demanded differs, it draws through for shaking and holding the above-mentioned energy absorption member 12a that there is nothing, and communalization of a member 15 (drawing 5 -8) can be attained.
[0024] Next, drawing 2 shows the 2nd example of the gestalt of operation of this invention. In this example, the width method of bore 25a formed in energy absorption member 12b is changed covering the die-length direction of this bore 25a. That is, he is trying to become so gradually narrow that the width method of this bore 25a gone to the point (left end section of drawing 2) of the band-like metal plate which constitutes the above-mentioned energy absorption member 12b in this example. Thus, in the example of the book to constitute, in the range which formed the above-mentioned bore 25a among the above-mentioned band-like metal plates, the cross section (width method of a thickness dimension x fullness part) of this band-like metal plate becomes so large that it goes to a tip side. the striking energy which is absorbed for this reason, moving section 13b to a tip side by return at the time of a secondary collision -- the variation rate ahead of a steering column 3 (drawing 5 -7) -- an amount becomes large -- it is alike, and it follows, and can do greatly, and a more effective impact absorption can be performed from the field of operator protection. That is, in this example, the width method by the side of the end face of the above-mentioned bore 25a (right end side of drawing 2) is enlarged, and the impact load which joins an operator's body immediately after a secondary collision can be made small enough. For this reason, protection of an operator can be aimed at more effectively. Other configurations and operations are the same as that of the case of the 1st example mentioned above.
[0025] Next, drawing 3 shows example of another of the impact-absorbing type steering system incorporating the 1st-2nd-example energy absorption member 12a (12b) mentioned above. While fixing the radical edge of the above-mentioned energy absorption member 12a (12b) to the inferior surface of tongue of a steering column 3 in the case of the impact-absorbing type steering system shown in this drawing 3 , it drew through and member 15a is arranged to the inner circumference [which was supported into the part of immobilization into a car body] side which is clinch section 13a (13b). therefore -- this -- it drew through and member 15a is prepared more back than the end face section of the above-mentioned energy absorption member 12a (12b). That is, arrangement of energy absorption member 12a (12b) is contrary to the above-mentioned case approximately. The configuration and operation of this energy absorption member 12a (12b) itself are the same as that of the case of the 1-2nd example mentioned above.
[0026] In addition, drawing 4 shows each impact absorptivity ability with structure the structure of this invention mentioned above, and conventionally which was mentioned above. A continuous line alpha the impact absorptivity ability of the conventional energy absorption member shown in said drawing 5 -7 which does not form the bore in the crosswise pars intermedia of a metal plate among this drawing 4 the chain line beta The impact absorptivity ability [of the 2nd example] of energy absorption member 12b of the gestalt of operation of this invention the broken line gamma indicated the impact absorptivity ability [of the 1st example] of energy absorption member 12a of the gestalt of operation of this invention shown in drawing 1 to be to drawing 2 is shown, respectively. In addition, the location of changing point I which appeared on the above-mentioned chain line beta and a broken line gamma, RO, and Ha can be freely adjusted by changing the width of face of Bores 25 and 25a mentioned above, die length, a configuration, etc. That is, the impact absorptivity ability required of various automobiles is easily realizable by choosing suitably the configuration (it also being able to consider as configurations other than the configuration shown in above-mentioned drawing 1 -2) of the bore formed in the crosswise pars intermedia of this energy absorption member, width of face, die length, etc. in the case of the energy absorption member of this invention.
[0027]
[Effect of the Invention] Since the energy absorption member for impact-absorbing type steerings of this invention is constituted and acts as it was described above, it can attain communalization of the member for

shaking and holding the energy absorption member of this invention that there is nothing among the types of a car from which the impact absorptivity ability demanded differs. Consequently, a manufacturing cost can be reduced.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The perspective view of an energy absorption member showing the 1st example of the gestalt of operation of this invention.
[Drawing 2] The perspective view showing this 2nd example.
[Drawing 3] The partial side elevation showing example of another of the impact-absorbing type steering system incorporating the energy absorption member of the 1-2nd example of the gestalt of operation of this invention.
[Drawing 4] The diagram comparing and showing the impact absorptivity ability of an energy absorption member with structure this invention and conventionally.
[Drawing 5] The outline side elevation of the impact-absorbing type steering system incorporating the conventional energy absorption member.
[Drawing 6] The decomposition perspective view corresponding to the X section of drawing 5 .
[Drawing 7] The outline side elevation corresponding to the X section of drawing 5 shown in the condition before and after a secondary collision.
[Drawing 8] For drawing which draws through, shows the member and looked at (a) from the left of (b), and (b), the Y-Y sectional view of (a) and (c) are the Z-Z sectional view of (a).
[Description of Notations]
1 Steering Wheel
2 Steering Shaft
3 Steering Column
4 Bearing Bracket
5 Car Body
6 Tie-down Plate Section
7 Notching
8 Sliding Bracket
9 Sliding-Plate Section
10 Insertion Hole
11 Bolt
12, 12a, 12b Energy absorption member
13, 13a, 13b Clinch section
14 Insertion Hole
15 15a It draws through and is a member.
16a, 16b Monotonous section
17 Continuation Section
18 Flange
19 Guide Protruding Piece
20 Guide Plate
21 Engagement Section
22 Fitting-ed Section
23 Engaged Portion
24 Prevention Itabe
25 25a Bore

[Translation done.]